

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 06-210869

(43)Date of publication of application : 02.08.1994

(51)Int.Cl.

B41J 2/175

B41J 2/01

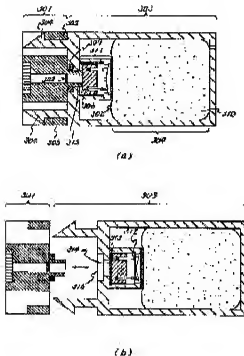
(21)Application number : 05-006931

(71)Applicant : CANON INC

(22)Date of filing : 19.01.1993

(72)Inventor : UJITA TOSHIHIKO

(54) INK JET RECORDING UNIT



(57)Abstract:

PURPOSE: To positively connect an ink cartridge and a recording unit to each other and readily disconnect them from each other by means of a simple and inexpensive mechanism.

CONSTITUTION: The title unit are provided a joining mechanism 304 capable of disconnecting an ink jet recording head 301 and an ink cartridge 303, and a mechanism for closely contacting ink communication passages with one another at the time of joining. In this manner, the ink jet recording head and the ink cartridge are engaged with each other by means of twin pawls whereby they are stably joined to each other and can be readily separated from each other. Also, close contacting of the ink communication passages at the time of joining is made positive by means of a sealing material.

LEGAL STATUS

[Date of request for examination] 10.06.1998

[Date of sending the examiner's decision of rejection] 28.11.2000

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision
of rejection]

[Date of requesting appeal against examiner's
decision of rejection]

[Date of extinction of right]

* NOTICES *

JP0 and NCIP1 are not responsible for any damages caused by the use of this translation.

1.This document has been translated by computer. So the translation may not reflect the original precisely.

2.**** shows the word which can not be translated.

3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]

[Claim 1] The ink jet record unit characterized by having the splicing-machine style which is the ink jet record unit which an ink droplet is made to fly and is recorded on a recorded object, and makes disengageable an ink jet recording head and an ink cartridge, and the bond part to which ink passage is stuck at the time of connection by equipping the carriage of an ink jet recording apparatus exchangeable, and being able to give a printing signal and drive energy.

[Claim 2] It is the ink jet record unit according to claim 1 which said carriage has the tank separation mechanism into which said ink cartridge is made to separate from said ink jet record unit, and is characterized by the connection force of said splicing-machine style being smaller than the separating power on which a tank separation mechanism acts.

[Claim 3] It is the ink jet record unit according to claim 1 to 2 characterized by for said ink cartridge having the bulb which prevents exsorption of ink from a connection at the time of separation from said ink jet record unit, and the elastic member which energizes this bulb outward from the inside of this ink cartridge, and the applied force of this elastic member being smaller than the connection force of said splicing-machine style.

[Claim 4] Said bond part is an ink jet record unit according to claim 1 to 3 characterized by having an O ring.

[Claim 5] The connection force of said splicing-machine style is an ink jet record unit according to claim 1 to 4 characterized by being below 19.6Ns (about 2 kgf(s)) more than 9.8N (about 1 kgf).

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention is an ink jet recording apparatus which it flies [recording apparatus] and makes a drop record on a recorded object, and an ink jet recording head and an ink cartridge are related mutually in more detail at the ink jet record unit which can be detached and attached.

[0002]

[Description of the Prior Art] In fluid injection recording devices, such as an ink jet recording device using liquid ink as record material As the miniaturization is called for in recent years and it is shown in the thing which has arranged the record unit IJC which unified the recording head as a record means, and the ink cartridge as a liquid storage container on the printer carriage HC

of the recording apparatus IJRA as shown in drawing 1 , and drawing 2 As a recording head 104 and an ink cartridge 105 can furthermore be separated, the thing of a type which exchanges only ink cartridges is proposed. This is because a miniaturization and the simplification of the device of the body of a recording device are possible compared with the thing of a device which is fixed in the body of a printer like the ink cartridge of equipment before, and sends ink to the recording head on carriage by a tube etc.

[0003] However, in order to attain the above-mentioned demand, the following technical problems occurred. In order to attain the miniaturization of equipment, the miniaturization of an ink jet record unit is required inevitably. However, contraction of the size of a tank is reduction of the absolute magnitude of the ink to connote, and leads to the rise of tank exchange frequency. The rise of tank exchange frequency invites the rise of about [giving troublesomeness] and a running cost to a user. Furthermore, since there is the need of fully taking into consideration the safety practice over ink leakage, that structure is complicated poses a problem.

[0004]

[Problem(s) to be Solved by the Invention] in an ink jet record unit with the above-mentioned ink jet recording head and an ink cartridge disengageable to arbitration, this invention connects a record unit with an ink cartridge certainly by the easy and cheap device, and forms an ink connection way -- making -- moreover -- reverse -- easy -- separation -- let it be a technical problem to suppose that it is exchangeable.

[0005]

[Means for Solving the Problem] The configuration for solving the above-mentioned technical problem is as follows. That is, it is an ink jet record unit and this ink jet record unit seals ink passage from the outside by the splicing-machine style which makes disengageable an ink jet recording head and an ink cartridge, and the bond part to which ink passage is stuck at the time of connection.

[0006] Moreover, the valve mechanism in a tank acts at the time of separation, and exsorption of the ink from a tank is prevented.

[0007]

[Function] since the ink jet record units of this invention are the above configurations, in an ink jet record unit with an ink jet recording head and an ink cartridge disengageable to arbitration, they connect a record unit with an ink cartridge certainly by the easy and cheap device, and form an ink connection way -- making -- moreover -- reverse -- easy -- separation -- suppose that it is exchangeable.

[0008] Furthermore, between the separating power of the separation mechanism currently prepared for the ink jet recording apparatus for separating the connection force, ink cartridge, and ink jet recording head of a splicing-machine style and the spring repulsive force of said valve mechanism in an ink cartridge is set up as follows.

[0009] $F_j - F_v < - F_{Fj} >>$ Spring repulsive force [0010] of the valve mechanism in the separating power F_v :ink cartridge of the separation mechanism of the connection force F_{Fj} :ink jet recording apparatus of a $F_v F_j$:ink jet recording head and an ink cartridge

[Example] Hereafter, the example of this invention is explained to a detail with reference to a drawing.

[0011] Drawing 3 (a) and (b) can show an example of the configuration of the ink cartridge one apparatus recording head unit by this invention, and can specifically apply it to an ink jet recording device like drawing 1 . It is prepared as the filter 302 for usually removing the dust in

ink to the ink jet recording head 301 is passage, and the diameter of an effective hole of a filter is 5 microns - 20 microns. It is symmetrically allotted to the direction of desorption, and association with an ink jet recording head and the ink cartridge 303 of this example is made by [1 set which projected in one from the ink cartridge of] both ***** (ing), as it ceers and the splicing-machine style 304 of ** and the accession department 305 of an ink jet recording device are shown in drawing 3 . The ink delivery pipe 315 of an ink jet recording head engages with the valve system 311 of an ink cartridge at association and coincidence, and supply of ink is attained from an ink cartridge by retreating a valve in the direction of drawing Nakamigi. O ring 307 performs seal association of the connection of an ink delivery pipe and a valve system to coincidence. The cartridge filter 308 is formed in the maximum upstream of a valve system in the ink cartridge.

[0012] There is ink ** 310 in the upstream of a cartridge filter. Ink ** of this example has the structure where ink comes to sink into the porous body by which compression receipt was carried out. In order to stabilize the engine performance of an ink jet recording apparatus generally, it is necessary to maintain at negative the pressure of the ink which acts on the delivery of an ink jet recording head. It is common to make the ink in an ink cartridge into negative pressure for that purpose. Ink is controlled by this example to negative pressure using the capillary force of a porous body. The valve 306 is formed by elastic members, such as rubber, and can slide on the interior of a valve system.

[0013] As shown in drawing 4 , after the separation lever 403 in the printer carriage HC separates the ink jet recording head 401 and an ink cartridge 402, when the closure section 313 of a valve and the receptacle section 314 of a valve stick, opening 316 of an ink cartridge is sealed according to the repulsive force of the valve spring 312 of drawing 3 . Thereby, inside an ink cartridge, ink can dry at that ink leaks with the impacts at the time of transportation etc. from opening of the ink cartridge after separation, the time of storage, etc., or it can prevent at them that the viscosity of ink rises etc.

[0014] Both ***** of the pawl of a lot mentioned above are structures simple and effective in operating stably the O ring as a sealing member which seals an ink connection way. By this example, ethylene propylene rubber (EPDM) is adopted as the quality of the material of an O ring. Although EPDM is the comparatively general rubber quality of the material, it excels especially as an application in this case. It is because high gas barrier nature, ink-proof nature, end-proof ***** , non-adhesiveness, and the still more nearly required creep resistance as an O ring are excellent.

[0015] this ink connection way -- getting it blocked -- by preparing the bond part to which ink passage is stuck, when the ink jet recording head and the ink cartridge have joined together, the negative pressure condition inside a unit can be maintained, or the ink leakage from a bond part can be prevented.

[0016] the power relationship with the separating power of the separation mechanism of an ink jet recording device which divides an ink jet recording head and an ink cartridge into the repulsive force pan of the ink jet recording head shown in the above-mentioned example, and the bonding strength of an ink cartridge and the valve at the time of association -- $F_j - F_v < - F_l F_j >>$ What is necessary is just the spring repulsive force of the valve mechanism in the separating power F_v :ink cartridge of the separation mechanism of the connection force F_l :ink jet recording device of a $F_v F_j$:ink jet recording head and an ink cartridge.

[0017] in order to make it operate lightly and certainly on real use furthermore -- 9.8Ns < -- $F_j < - 19.6Ns$ -- again -- $F_v < -$ It is desirable that it is 4.9Ns.

[0018] It can dissociate and a user can recombine the ink jet recording head and the ink cartridge with such an ink supply means with arbitration. Moreover, association of an ink cartridge and an ink jet recording head is made into 1 set of both ** with which jeer and the splicing-machine style of ** is made to engage, respectively, since it is very extremely stable, even if desorption is repeated, a printing location does not change, or a quality of printed character is not reduced. Furthermore, even if it separates an ink jet record unit from an ink jet recording device, it can exist independently as a unit. When following, for example, performing mono-color printing using this ink jet recording apparatus, the unit release lever 501 of the printer carriage HC is raised like drawing 5, and correspondence becomes possible simply only by exchanging as an ink jet record unit. It can prevent that will jeer on the average, separating power will work on the pawl (splicing-machine style) of **, a load focuses on a part of pawl by using a separation mechanism like this unit desorption lever, and a joint is damaged.

[0019] Drawing 6 (a) thru/or (c) are the perspective views showing typically the mode of the ink cartridge of the ink jet record unit which can apply this invention.

[0020] The ink cartridge shown in each drawing is an ink cartridge which can reverse and carry the upper and lower sides to the carriage of a recording apparatus, and opening (un-illustrating) for supplying ink to the recording head connected with this ink cartridge and atmospheric-air free passage opening (un-illustrating) for making the open air open the interior of an ink cartridge for free passage are arranged. And it is prepared in two places so that the claw part 1002 which achieves the duty of the skid when removing an ink cartridge from a recording device, and the notching section 1001 for engaging with the heights by the side of a recording device at the time of loading to a recording device may correspond to the vertical inversion of an ink cartridge.

[0021] The above-mentioned notching section is arranged inside the side attachment wall of an ink cartridge, and drawing 6 (a) can protect the heights by the side of a recording device from the exterior at the time of loading to a recording device.

[0022] Drawing 6 (b) and (c) show the case where the side attachment wall of an ink cartridge is not arranged even on the location of the above-mentioned notching section, and although the effectiveness of the above protection does not have them, they can make manufacture of an ink cartridge easy.

[0023]

[Effect of the Invention] As explained above, according to this invention, by preparing the sealing section in which ink passage is stuck, when the ink jet recording head and the ink cartridge have joined together, the negative pressure condition inside a unit can be maintained, and the ink leakage from a bond part can be prevented. Moreover, since the association is stable, even if it separates into arbitration and combines with it, a quality of printed character etc. is not affected, but unit exchange can also be performed further easily. therefore, in an ink jet record unit disengageable to arbitration, an ink jet recording head and an ink cartridge connect a record unit with an ink cartridge certainly by the easy and cheap device, and form an ink connection way -- making -- moreover -- reverse -- easy -- separation -- it becomes exchangeable.

TECHNICAL FIELD

[Industrial Application] This invention is an ink jet recording apparatus which it flies [recording apparatus] and makes a drop record on a recorded object, and an ink jet recording head and an ink cartridge are related mutually in more detail at the ink jet record unit which can be detached and attached.

PRIOR ART

[Description of the Prior Art] In fluid injection recording devices, such as an ink jet recording device using liquid ink as record material As the miniaturization is called for in recent years and it is shown in the thing which has arranged the record unit IJC which unified the recording head as a record means, and the ink cartridge as a liquid storage container on the printer carriage HC of the recording apparatus IJRA as shown in drawing 1 , and drawing 2 As a recording head 104 and an ink cartridge 105 can furthermore be separated, the thing of a type which exchanges only ink cartridges is proposed. This is because a miniaturization and the simplification of the device of the body of a recording device are possible compared with the thing of a device which is fixed in the body of a printer like the ink cartridge of equipment before, and sends ink to the recording head on carriage by a tube etc.

[0003] However, in order to attain the above-mentioned demand, the following technical problems occurred. In order to attain the miniaturization of equipment, the miniaturization of an ink jet record unit is required inevitably. However, contraction of the size of a tank is reduction of the absolute magnitude of the ink to connote, and leads to the rise of tank exchange frequency. The rise of tank exchange frequency invites the rise of about [giving troublesomeness] and a running cost to a user. Furthermore, since there is the need of fully taking into consideration the safety practice over ink leakage, that structure is complicated poses a problem.

EFFECT OF THE INVENTION

[Effect of the Invention] As explained above, according to this invention, by preparing the sealing section in which ink passage is stuck, when the ink jet recording head and the ink cartridge have joined together, the negative pressure condition inside a unit can be maintained, and the ink leakage from a bond part can be prevented. Moreover, since the association is stable, even if it separates into arbitration and combines with it, a quality of printed character etc. is not affected, but unit exchange can also be performed further easily. therefore, in an ink jet record unit disengageable to arbitration, an ink jet recording head and an ink cartridge connect a record unit with an ink cartridge certainly by the easy and cheap device, and form an ink connection way -- making -- moreover -- reverse -- easy -- separation -- it becomes exchangeable.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] in an ink jet record unit with the above-mentioned ink jet recording head and an ink cartridge disengageable to arbitration, this invention connects a record unit with an ink cartridge certainly by the easy and cheap device, and forms an ink connection way -- making -- moreover -- reverse -- easy -- separation -- let it be a technical problem to suppose that it is exchangeable.

MEANS

[Means for Solving the Problem] The configuration for solving the above-mentioned technical problem is as follows. That is, it is an ink jet record unit and this ink jet record unit seals ink passage from the outside by the splicing-machine style which makes disengageable an ink jet recording head and an ink cartridge, and the bond part to which ink passage is stuck at the time of connection.

[0006] Moreover, the valve mechanism in a tank acts at the time of separation, and exsorption of the ink from a tank is prevented.

OPERATION

[Function] since the ink jet record units of this invention are the above configurations, in an ink jet record unit with an ink jet recording head and an ink cartridge disengageable to arbitration, they connect a record unit with an ink cartridge certainly by the easy and cheap device, and form an ink connection way -- making -- moreover -- reverse -- easy -- separation -- suppose that it is exchangeable.

[0008] Furthermore, between the separating power of the separation mechanism currently prepared for the ink jet recording apparatus for separating the connection force, ink cartridge, and ink jet recording head of a splicing-machine style and the spring repulsive force of said valve mechanism in an ink cartridge is set up as follows.

[0009] Fj-Fv < -- FIFj >> Spring repulsive force of the valve mechanism in the separating power Fv:ink cartridge of the separation mechanism of the connection force FI:ink jet recording apparatus of a FvFj:ink jet recording head and an ink cartridge

EXAMPLE

[Example] Hereafter, the example of this invention is explained to a detail with reference to a drawing.

[0011] Drawing 3 (a) and (b) can show an example of the configuration of the ink cartridge one apparatus recording head unit by this invention, and can specifically apply it to an ink jet recording device like drawing 1 . It is prepared as the filter 302 for usually removing the dust in ink to the ink jet recording head 301 is passage, and the diameter of an effective hole of a filter is 5 microns - 20 microns. It is symmetrically allotted to the direction of desorption, and

association with an ink jet recording head and the ink cartridge 303 of this example is made by [1 set which projected in one from the ink cartridge of] both ***** (ing), as it ceers and the splicing-machine style 304 of ** and the accession department 305 of an ink jet recording device are shown in drawing 3 . The ink delivery pipe 315 of an ink jet recording head engages with the valve system 311 of an ink cartridge at association and coincidence, and supply of ink is attained from an ink cartridge by retreating a valve in the direction of drawing Nakamigi. O ring 307 performs seal association of the connection of an ink delivery pipe and a valve system to coincidence. The cartridge filter 308 is formed in the maximum upstream of a valve system in the ink cartridge.

[0012] There is ink ** 310 in the upstream of a cartridge filter. Ink ** of this example has the structure where ink comes to sink into the porous body by which compression receipt was carried out. In order to stabilize the engine performance of an ink jet recording apparatus generally, it is necessary to maintain at negative the pressure of the ink which acts on the delivery of an ink jet recording head. It is common to make the ink in an ink cartridge into negative pressure for that purpose. Ink is controlled by this example to negative pressure using the capillary force of a porous body. The valve 306 is formed by elastic members, such as rubber, and can slide on the interior of a valve system.

[0013] As shown in drawing 4 , after the separation lever 403 in the printer carriage HC separates the ink jet recording head 401 and an ink cartridge 402, when the closure section 313 of a valve and the receptacle section 314 of a valve stick, opening 316 of an ink cartridge is sealed according to the repulsive force of the valve spring 312 of drawing 3 . Thereby, inside an ink cartridge, ink can dry at that ink leaks with the impacts at the time of transportation etc. from opening of the ink cartridge after separation, the time of storage, etc., or it can prevent at them that the viscosity of ink rises etc.

[0014] Both ***** of the pawl of a lot mentioned above are structures simple and effective in operating stably the O ring as a sealing member which seals an ink connection way. By this example, ethylene propylene rubber (EPDM) is adopted as the quality of the material of an O ring. Although EPDM is the comparatively general rubber quality of the material, it excels especially as an application in this case. It is because high gas barrier nature, ink-proof nature, end-proof ***** , non-adhesiveness, and the still more nearly required creep resistance as an O ring are excellent.

[0015] this ink connection way -- getting it blocked -- by preparing the bond part to which ink passage is stuck, when the ink jet recording head and the ink cartridge have joined together, the negative pressure condition inside a unit can be maintained, or the ink leakage from a bond part can be prevented.

[0016] the power relationship with the separating power of the separation mechanism of an ink jet recording device which divides an ink jet recording head and an ink cartridge into the repulsive force pan of the ink jet recording head shown in the above-mentioned example, and the bonding strength of an ink cartridge and the valve at the time of association -- Fj-Fv < -- FIFj >> What is necessary is just the spring repulsive force of the valve mechanism in the separating power Fv:ink cartridge of the separation mechanism of the connection force FI:ink jet recording device of a FvFj:ink jet recording head and an ink cartridge.

[0017] in order to make it operate lightly and certainly on real use furthermore -- 9.8Ns < -- Fj < -- 19.6Ns -- again -- Fv < -- It is desirable that it is 4.9Ns.

[0018] It can dissociate and a user can recombine the ink jet recording head and the ink cartridge with such an ink supply means with arbitration. Moreover, association of an ink cartridge and an

ink jet recording head is made into 1 set of both ** with which jeer and the splicing-machine style of ** is made to engage, respectively, since it is very extremely stable, even if desorption is repeated, a printing location does not change, or a quality of printed character is not reduced. Furthermore, even if it separates an ink jet record unit from an ink jet recording device, it can exist independently as a unit. When following, for example, performing mono-color printing using this ink jet recording apparatus, the unit release lever 501 of the printer carriage HC is raised like drawing 5, and correspondence becomes possible simply only by exchanging as an ink jet record unit. It can prevent that will jeer on the average, separating power will work on the pawl (splicing-machine style) of **, a load focuses on a part of pawl by using a separation mechanism like this unit desorption lever, and a joint is damaged.

[0019] Drawing 6 (a) thru/or (c) are the perspective views showing typically the mode of the ink cartridge of the ink jet record unit which can apply this invention.

[0020] The ink cartridge shown in each drawing is an ink cartridge which can reverse and carry the upper and lower sides to the carriage of a recording apparatus, and opening (un-illustrating) for supplying ink to the recording head connected with this ink cartridge and atmospheric-air free passage opening (un-illustrating) for making the open air open the interior of an ink cartridge for free passage are arranged. And it is prepared in two places so that the claw part 1002 which achieves the duty of the skid when removing an ink cartridge from a recording device, and the notching section 1001 for engaging with the heights by the side of a recording device at the time of loading to a recording device may correspond to the vertical inversion of an ink cartridge.

[0021] The above-mentioned notching section is arranged inside the side attachment wall of an ink cartridge, and drawing 6 (a) can protect the heights by the side of a recording device from the exterior at the time of loading to a recording device.

[0022] Drawing 6 (b) and (c) show the case where the side attachment wall of an ink cartridge is not arranged even on the location of the above-mentioned notching section, and although the effectiveness of the above protection does not have them, they can make manufacture of an ink cartridge easy.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] (a): Recording device IJRA

(b): Printer carriage HC

[Drawing 2] Ink cartridge one apparatus recording head unit IJC appearance

[Drawing 3] Ink cartridge one apparatus recording head unit IJC sectional view

(a): At the time of separation

(b): At the time of connection

[Drawing 4] Drawing which separated the ink cartridge and the recording head unit with the separation lever in the printer carriage HC

[Drawing 5] Drawing which detaches and attaches an ink cartridge one apparatus recording head unit from the printer carriage HC

[Drawing 6] Drawing of an ink cartridge

(a): They are those with a side attachment wall to the notching section.

(b), (c): With [the notching section] no side attachment wall

[Description of Notations]

104 Ink Jet Recording Head
105 Ink Cartridge
301 Ink Jet Recording Head
302 Filter
303 Ink Cartridge
304 Splicing-Machine Style
305 Accession Department
306 Valve
307 O Ring
308 Cartridge Filter
310 Ink Reservoir
311 Valve System
312 Valve Spring
313 Seal Section of Valve
314 Accession Department of Valve
315 Ink Delivery Pipe
316 Opening
401 Ink Jet Recording Head
402 Ink Cartridge
403 Separation Lever
501 Unit Release Lever

特開平6-210869

(43)公開日 平成6年(1994)8月2日

(51)Int.Cl. ⁵	識別記号	庁内整理番号	F I	技術表示箇所
B 4 1 J 2/175 2/01		8306-2C 8306-2C	B 4 1 J 3/ 04	1 0 2 Z 1 0 1 Z

審査請求 未請求 請求項の数5 O L (全 6 頁)

(21)出願番号 特願平5-6931

(22)出願日 平成5年(1993)1月19日

(71)出願人 000001007

キヤノン株式会社

東京都大田区下丸子3丁目30番2号

(72)発明者 氏田 敏彦

東京都大田区下丸子3丁目30番2号キヤノン株式会社内

(74)代理人 弁理士 丸島 慎一

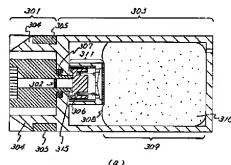
(54)【発明の名称】 インクジェット記録ユニット

(57)【要約】

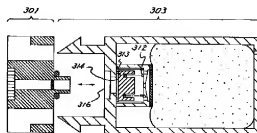
【目的】 インクカートリッジと記録ユニットを簡単に廉価な機構で確実に連結し、また逆に容易に分離交換可能とする。

【構成】 インクジェット記録ヘッドとインクカートリッジとを分離可能とする接合機構と、結合時にインク接続路を密着させる機構をもつ。

【効果】 両持爪により係合させることにより、結合が安定するとともに容易に分離でき、また接合時のインク流路の密着も封着部材により確実である。



(a)



(b)

【特許請求の範囲】

【請求項１】 インクジェット記録装置のキャリッジに交換可能に装着され、印字信号と駆動エネルギーを与えられることにより、インク滴を飛翔せしめ、被記録物に記録するインクジェット記録ユニットであって、インクジェット記録ヘッドとインクカートリッジとを分離可能とする接合機構と、接続時にインク流路を密着させる結合部と、を有することを特徴とするインクジェット記録ユニット。

【請求項２】 前記キャリッジは、前記インクカートリッジを前記インクジェット記録ユニットから分離せしめるタンク分離機構を有し、前記接合機構の連結力は、タンク分離機構の作用する分離力よりも小さいことを特徴とする請求項１に記載のインクジェット記録ユニット。

【請求項３】 前記インクカートリッジは、前記インクジェット記録ユニットからの分離時に接続部からインクの漏出を防止するバルブと、該バルブを該インクカートリッジの内側より外向きに付勢する弾性部材と、を有し、該弾性部材の作用力は前記接合機構の連結力よりも小さいことを特徴とする請求項１乃至請求項２に記載のインクジェット記録ユニット。

【請求項４】 前記結合部は、Ｏリングを有することを特徴とする請求項１乃至請求項３に記載のインクジェット記録ユニット。

【請求項５】 前記接合機構の連結力は、 9.8 N （約 1 kg f ）以上 19.6 N （約 2 kg f ）以下であることを特徴とする請求項１乃至請求項４に記載のインクジェット記録ユニット。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】 本発明は液滴を飛翔して被記録物に記録させるインクジェット記録装置であって、更に詳しくはインクジェット記録ヘッドとインクカートリッジが相互に着脱が可能なインクジェット記録ユニットに関する。

【０００２】

【従来の技術】 液体インクを記録材として用いるインクジェット記録装置などの液体噴射記録装置においては、近年小型化が求められてきており、図１に示すような記録装置１ＪＲＡのプリンタキャリッジＨＣ上に記録手段としての記録ヘッドと液体貯蔵容器としてのインクカートリッジとを一体化した記録ユニット１ＪＣを配置したものの、また図２に示すように、さらに記録ヘッド１０４とインクカートリッジ１０５とを分離できるようにして、インクカートリッジのみを交換するタイプのものが提案されている。これは従来装置のインクカートリッジのようにプリンタ本体内に固定され、チューブなどでインクをキャリッジ上の記録ヘッドに送る機構のものに比べ、小型化と記録装置本体の機構の簡素化とが可能であるためである。

【０００３】 しかしながら前述の要求を達成するためには以下のような技術的課題があった。装置の小型化を図るためには必然的にインクジェット記録ユニットの小型化が要求される。しかしながらタンクのサイズの縮小は内包するインクの絶対量の減少であり、タンク交換頻度の上昇につながる。タンク交換頻度の上昇は使用者に煩わしさを与えるばかりか、ランニングコストのアップを招く。更にインク漏れに対する安全対策を十分に考慮する必要があるため、構造が複雑化することが問題となる。

【０００４】

【発明が解決しようとする課題】 本発明は、上記インクジェット記録ヘッドとインクカートリッジが任意に分離可能なインクジェット記録ユニットにおいて、インクカートリッジと記録ユニットを簡単に廉価な機構で確実に連結し、インク接続路を形成させ、また逆に容易に分離交換可能とすることを課題とする。

【０００５】

【課題を解決するための手段】 上記課題を解決するための構成は、次のとおりである。即ち、インクジェット記録ユニットであって、該インクジェット記録ユニットはインクジェット記録ヘッドとインクカートリッジとを分離可能とする接合機構と、接続時にインク流路を密着させる結合部とによりインク流路を外部から密封する。

【０００６】 また分離時にはタンク内のバルブ機構が作用しタンクからのインクの漏出を防止する。

【０００７】

【作用】 本発明のインクジェット記録ユニットは上記のような構成であるため、インクジェット記録ヘッドとインクカートリッジが任意に分離可能なインクジェット記録ユニットにおいて、インクカートリッジと記録ユニットを簡単に廉価な機構で確実に連結し、インク接続路を形成させ、また逆に容易に分離交換可能とする。

【０００８】 更に接合機構の連結力とインクカートリッジとインクジェット記録ヘッドとを分離するためのインクジェット記録装置に用意されている分離機構の分離力、及びインクカートリッジ内の前記バルブ機構のバネ反発力との間を以下のように設定する。

【０００９】 $F_j - F_v < F_l$

$F_j >> F_v$

F_j : インクジェット記録ヘッドとインクカートリッジの連結力

F_l : インクジェット記録装置の分離機構の分離力

F_v : インクカートリッジ内のバルブ機構のバネ反発力

【００１０】

【実施例】 以下、図面を参照して本発明の実施例を詳細に説明する。

【００１１】 図３（ａ）及び（ｂ）は、本発明によるインクカートリッジ一体型記録ヘッドユニットの構成の一例を示し、具体的には図１のようなインクジェット記録

装置に適用可能なものである。インクジェット記録ヘッド301には通常インク中のゴミを除去するためのフィルター302が流路の途中に設けられており、フィルターの有効孔径は5ミクロン〜20ミクロンである。インクジェット記録ヘッドと本実施例のインクカートリッジ303との結合は、インクカートリッジから一体的に突出した1組のやじり状の接合機構304とインクジェット記録装置の受入部305とが、例えば図3に示されるように脱着方向に対して対称的に配され、両持係合することによりなされる。結合と同時にインクジェット記録ヘッドのインク供給パイプ315はインクカートリッジの弁機構311と係合し、弁を図中右方向に後退させる事により、インクカートリッジからインクの供給が可能となる。同時にオリング307がインク供給パイプと弁機構との接続部の密封結合を行う。インクカートリッジ内、弁機構の最上流にはカートリッジフィルター308が設けられている。

【0012】カートリッジフィルターの上流にはインク溜310がある。この実施例のインク溜は圧縮収納された多孔質体インクが含浸されている構造を有するものである。一般にインクジェット記録装置の性能を安定させるためにはインクジェット記録ヘッドの吐出口に作用するインクの圧力を負に保つ必要がある。そのためにはインクカートリッジ内のインクを负压にするのが一般的である。本実施例では多孔質体の毛管力を利用してインクを负压に制御している。弁306はゴムなどの弾性部材で形成されており、弁機構内部を撓動可能である。

【0013】図4に示すようにインクジェット記録ヘッド401とインクカートリッジ402とをプリンターキャリアリッジHCにある分離レバー403により分離した後は、図3のバルブスプリング312の反発力により、弁の封止部313と弁の受け部314とが密着する事によりインクカートリッジの開口部316の密封を行う。これにより、分離後のインクカートリッジの開口部より輸送時などの衝撃でインクが漏れることや、保管時などにインクカートリッジ内部で、インクが乾燥したり、インクの粘度が上昇することなどを防止することができる。

【0014】前述した一組の爪の両持構造はインク接続路の密封を行う封着部材としてのオリングを安定的に動作させるのに単純かつ有効な構造である。オリングの材質として本実施例ではエチレンプロピレンゴム（EPDM）を採用する。EPDMは比較的一般的なゴム材質であるが、特に本件の用途として優れている。それは、高いガスバリア性、耐インク性、耐切り裂き性、非粘着性、さらにオリングとして必要な耐クリープ性が優れているためである。

【0015】このインク接続路、つまりはインク流路を密着させる結合部を設けることにより、インクジェット記録ヘッドとインクカートリッジとが結合している際にユニット内部の負圧状態を維持したり、結合部からのイ

ンク漏れを防いだりすることができる。

【0016】上述の実施例で示すインクジェット記録ヘッドとインクカートリッジの結合力、結合時の弁の反発力さらにインクジェット記録ヘッドとインクカートリッジを分離するインクジェット記録装置の分離機構の分離力との力関係は

$$F_j - F_v < F_l$$

$$F_j > F_v$$

F_j : インクジェット記録ヘッドとインクカートリッジの連結力

F_l : インクジェット記録装置の分離機構の分離力

F_v : インクカートリッジ内のバルブ機構のバネ反発力であれば良い。

【0017】さらに実使用上軽快かつ確実に動作させるためには、

$$9.8N < F_j < 19.6N$$

$$\text{また} \quad F_v < 4.9N$$

であることが望ましい。

【0018】このようなインク供給手段を有したインクジェット記録ヘッドとインクカートリッジとは使用者が任意に分離、再結合可能である。またインクカートリッジとインクジェット記録ヘッドの結合は、1組のやじり状の接合機構をそれぞれ係合させる両持としており、安定性は極めて高いため、脱着が繰り返されても両字位置が変化したり、印字品質を低下させることはない。さらに、インクジェット記録ユニットをインクジェット記録装置から分離してもユニットとして独立に存在できる。したがって、例えば本インクジェット記録装置を使用してモノカラー印刷を行う場合、図5のようにプリンタキャリアリッジHCのユニット着脱レバー501をあげ、インクジェット記録ユニットとして交換する事だけでなく単に対応が可能となる。このユニット着脱レバーのような分離機構を用いることで、平均的にやじり状の爪（接合機構）に分離力が働くことになり、爪の一部に負荷が集中するなどして、接合部が損傷することを防止できる。

【0019】図6（a）乃至（c）は、本発明を適用し得るインクジェット記録ユニットのインクカートリッジの態様を模式的に示す斜視図である。

【0020】各国で示されるインクカートリッジは、記録装置のキャリアリッジに対して上下を逆転して搭載することが可能なインクカートリッジであり、このインクカートリッジと接続される記録ヘッドにインクの供給を行うための開口部（不図示）と、インクカートリッジ内部を外気に連通させるための大気連通口（不図示）とが配されている。そして、インクカートリッジを記録装置から取りはずすときの滑り止め役目を果たす爪部1002と、記録装置への搭載時に記録装置側の凸部と係合するための切り欠き部1001とがインクカートリッジの上下遊転に対応するように2ヶ所に設けられている。

【0021】図6（a）は、上述の切り欠き部がインク

カートリッジの側壁より内側に配置されており、記録装置への搭載時に記録装置側の凸部を外部から保護することができる。

【0022】図6(b)(c)は、上述の切り欠き部の位置にまでインクカートリッジの側壁が配されていない場合を示しており、上述のような保護の効果はないがインクカートリッジの製造を容易にすることができる。

【0023】

【発明の効果】以上説明したように、本発明によれば、インク流路を密着させる封着部を設けることにより、インクジェット記録ヘッドとインクカートリッジとが結合している際にユニット内部の負圧状態を維持することや、結合部からのインク漏れを防ぐことができる。また、その結合が安定しているために任意に分離、結合しても印字品質等に影響を与えず、さらにユニット交換も容易に行なえる。したがって、インクジェット記録ヘッドとインクカートリッジが任意に分離可能なインクジェット記録ユニットにおいて、インクカートリッジと記録ユニットを簡単に廉価な機構で確実に連結し、インク接続路を形成させ、また逆に容易に分離交換可能となる。

【図面の簡単な説明】

【図1】(a)：記録装置IJRA

(b)：プリンタキャリッジHC

【図2】インクカートリッジ一体型記録ヘッドユニットIJC外観

【図3】インクカートリッジ一体型記録ヘッドユニットIJC断面図

(a)：分離時

(b)：連結時

【図4】プリンタキャリッジHCにある分離レバーに

てインクカートリッジと記録ヘッドユニットを分離した図

【図5】プリンタキャリッジHCからインクカートリッジ一体型記録ヘッドユニットを着脱する図

【図6】インクカートリッジの図

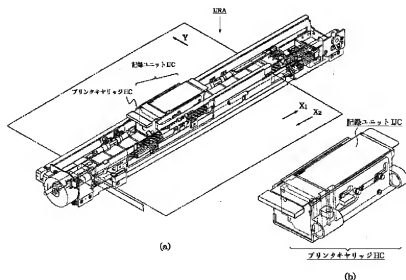
(a)：切り欠き部に側壁あり

(b)(c)：切り欠き部に側壁なし

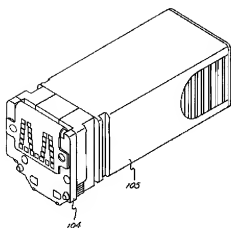
【符号の説明】

- 104 インクジェット記録ヘッド
- 105 インクカートリッジ
- 301 インクジェット記録ヘッド
- 302 フィルター
- 303 インクカートリッジ
- 304 接合機構
- 305 受入部
- 306 弁
- 307 Oリング
- 308 カートリッジフィルター
- 310 インク溜め
- 311 弁機構
- 312 バルブスプリング
- 313 弁の密封部
- 314 弁の受入部
- 315 インク供給パイプ
- 316 開口部
- 401 インクジェット記録ヘッド
- 402 インクカートリッジ
- 403 分離レバー
- 501 ユニット着脱レバー

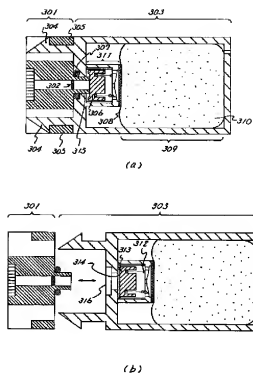
【図1】



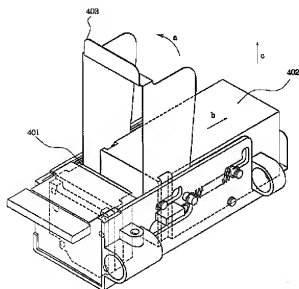
【図2】



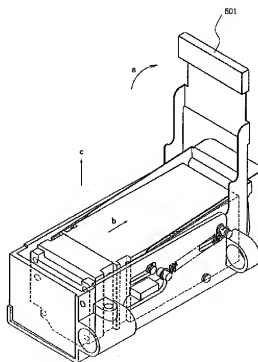
【図3】



【図4】



【図5】



【図6】

